

A REDESCRIPTION OF *ECHINASTER MODESTUS*  
PERRIER, 1881 (ASTEROIDEA: SPINULOSIDA)  
FROM THE EASTERN GULF OF MEXICO  
AND THE WEST INDIES

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*Abstract.*—The seastar *Echinaster modestus* Perrier, 1881, is redescribed and a lectotype is designated. *Echinaster* spp. from the west coast of Florida used in recent experimental studies are not *E. modestus*.

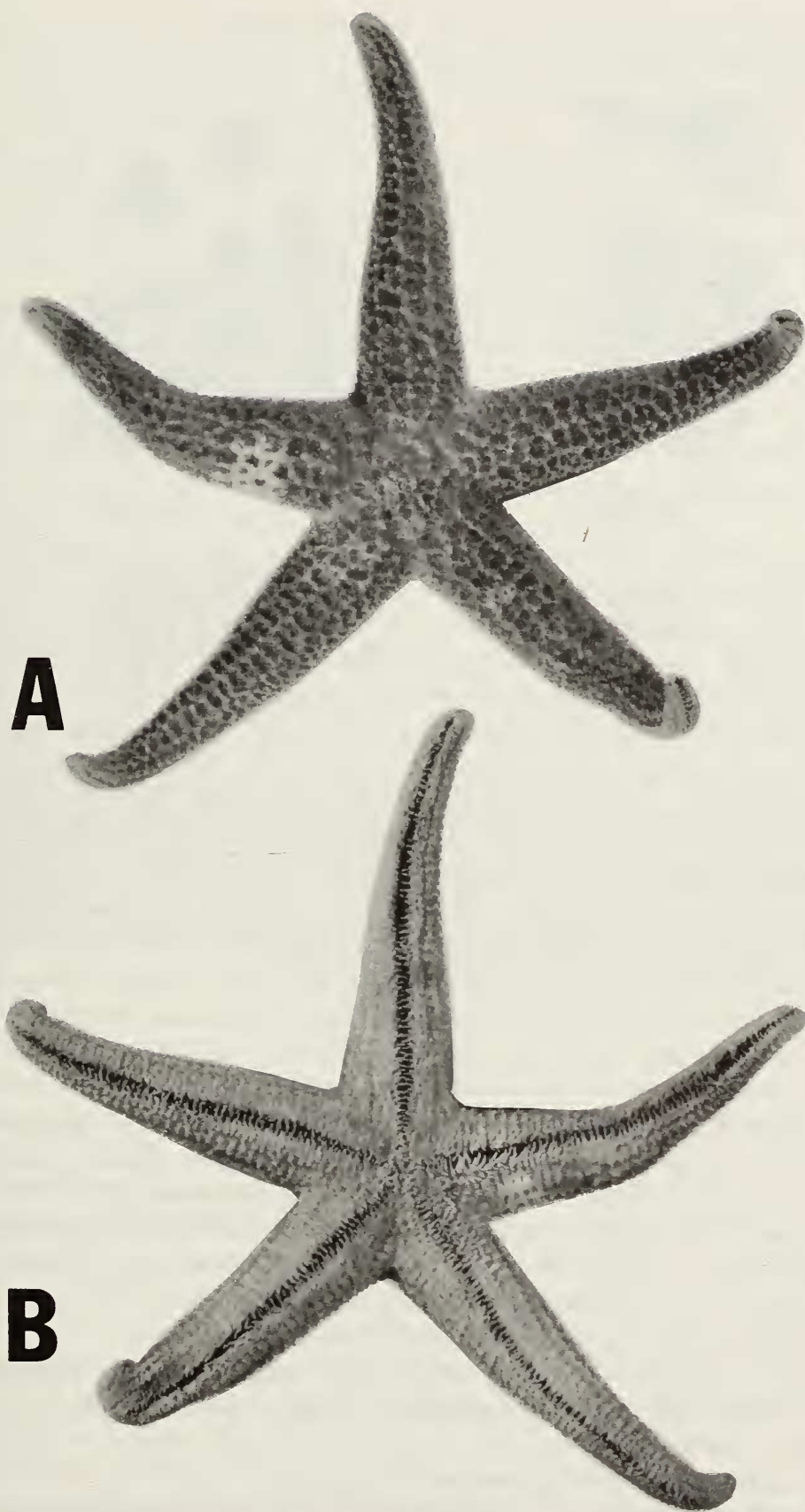
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During a morphological study of seastars of the genus *Echinaster* from the west coast of Florida, it was necessary for us to determine the identities of two common sibling species that have been called *E. spinulosus* (Ferguson, 1966, 1967, 1968), *E. echinophorus* (Ferguson, 1970, 1974; Atwood, 1973a, 1973b, 1973c; Atwood and Simon, 1973), *E. modestus* (Turner, 1976; Blake, 1978, 1980; Turner and Lawrence, 1979), and *Echinaster* (Ferguson, 1975a, 1975b, 1976, 1980). Based on the most recent monograph of seastars of the region (Downey, 1973), both forms must be assigned to *E. modestus* (Ferguson, 1975a, 1976; Turner, 1976; Turner and Lawrence, 1979); but a recent note (Campbell and Turner, 1979) gave three distinct morphological and meristic differences in the skeleton of the two forms. Examination of type-specimens by us has revealed that the two forms and Downey's (1973) material do not belong to *E. modestus*. Perrier's (1881, 1884) brief descriptions of *E. modestus* might have contributed to the present confusion, and Verrill's (1915) description of Perrier's specimens was equally brief. Walenkamp's (1979) detailed description seems to be based partly on material that differs from Perrier's type-specimens. Herein we redescribe *E. modestus* from the type material and designate a lectotype.

Family Echinasteridae Verrill, 1867  
Genus *Echinaster* Müller and Troschel, 1840  
*Echinaster modestus* Perrier, 1881  
Figs. 1-2

*Echinaster modestus* Perrier, 1881:7, 1884:206-207, pl. 3, fig. 7 (part).—  
Verrill, 1915:43-44 (part).—Clark, 1941:55.—Walenkamp, 1979:74-79  
(part).

*Material.*—MCZ 1080, Lectotype, 1 specimen (R = 34 mm, r = 8 mm),  
Blake Sta. 45 (101 fm, 25°33'N, 84°21'W).—MCZ 1119, Paralectotype, 1



**A**

**B**

Fig. 1. *Echinaster modestus*, MCZ 1080, Lectotype. A, Aboral view; B, Adoral view.

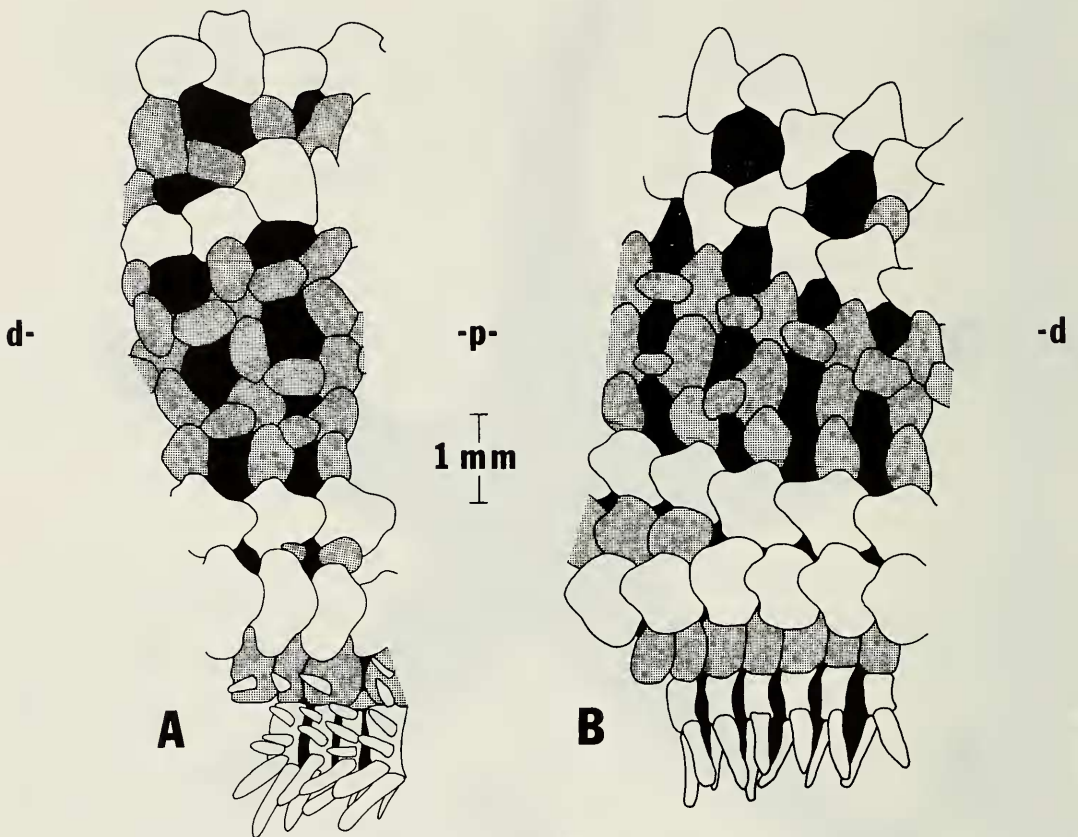


Fig. 2. *Echinaster modestus*, planar views of ray ossicles from midline of aboral surface (top) to the ambulacrum (bottom), near base of ray. Ossicles of primary skeleton unstippled; ossicles of secondary skeleton (except spines) stippled. Rows of ossicles, top to bottom: carinals, accessory ossicles, adradials, dorsolaterals, superomarginals, intermarginals, inferomarginals, actinolaterals, adambulacrals. Abbreviations: d, distal; p, proximal. A, MCZ 1080, Lectotype, full spination of adambulacrals 12-15 and actinolaterals shown; B, MCZ 1119, Paralectotype, only furrow spines of adambulacrals 12-17 shown.

specimen (R = 22 mm, r = 6 mm), *Blake Sta.* 157 (120 fm), Montserrat.—MCZ 4668, Paralectotype, 1 specimen (R = 26 mm, r = 8 mm), *Blake Sta.* 45 (101 fm, 25°33'N, 84°21'W).—MCZ 1081, 2 specimens (R = 9.5 mm, r = 2.7 mm; R = 8.1 mm, r = 2.9 mm), *Blake Sta.* 272 (76 fm) and 292 (56 fm), Barbados.—MCZ 1118, 1 specimen (R = 5.7 mm, r = 2.0 mm), *Blake Sta.* 276 (94 fm), Barbados.—MCZ 4001, 1 specimen (R = 56 mm, r = 11 mm), *Atlantis Sta.* 3303 (260 fm), Playa Baracoa, Cuba.

*Diagnosis.*—Rays 5, tapered, only slightly inflated at bases. Madreporite circular, with radiating gyri; peripheral spinules present. Aboral skeleton reticulate, with large papular areas. Adoral skeleton compact, with few papulae. Serial ossicles of rays: carinals, adradials, several rows of dorsolaterals, superomarginals, 1 short row of intermarginals, inferomarginals, 1-2

rows of actinolaterals, adambulacrals; all series except latter 2 with proximal imbrication; glassy tubercles present. Spines small, blunt, conical; generally 1 per ossicle, except for superomarginals (1–2), inferomarginals (2–4), adambulacrals (4–6), and mouth plates (6–7).

*Description of type-material.*—The following is based largely on MCZ 1080. Many details were confirmed in the two paralectotypes.

The rays taper uniformly to acute tips, with slight or no inflation near the bases. The smaller type-specimens are more robust (R:r, 3.7 and 3.3) than the larger (R:r, 4.3). The small, circular madreporite has a radiating system of sulci and gyri and bears 6–13 spinules on its periphery. Anal spinules number 8–14. The primary circlet has 1 (rarely 2) accessory ossicle between adjacent primary radials and interradials, but there is none between the madreporite and the primary radials of the bivium. Each primary radial bears 1–2 (usually 1) small, blunt spines. Other ossicles of the primary circlet and periproct bear 0–1 spine each.

The aboral skeleton is a loosely imbricating network. Papular areas are wider than or equal in diameter to the width of surrounding ossicles. Papulae are most abundant (3–7) between the carinals and adradials. The primary series of ossicles on the aboral surface are the carinals and adradials, each member of which bears a spine and overlaps the next proximal member (proximal imbrication). Members of the carinal series are triangular and alternate right and left of the midline; they are rarely separated by accessory ossicles. Accessory ossicles sometimes join the carinal and adradial series, which are otherwise directly joined. Members of the adradial series are triangular or quadrangular and are not separated by accessory ossicles. A few adradials have patches of glassy tubercles, but they appear eroded, perhaps from storage. The major secondary elements of the aboral skeleton are the dorsolaterals. Near the base of the ray, 3–5 dorsolaterals form a transverse series from each superomarginal to an adradial. The transverse series of dorsolaterals are joined by 1–2 longitudinal series of more superficial ossicles. A spine occurs on many members of the longitudinal series and on some of the transverse members, forming 1–2 irregularly spinous rows that extend  $\frac{4}{5}$  the length of the ray.

The adoral skeleton is compactly imbricate, with few papulae. Superomarginals and inferomarginals are quadrangular ossicles with broadly rounded corners. They bear eroded patches of glassy tubercles and have proximal imbrication. The 2 marginal series are separated at the base of the ray by a few intermarginals, each of which has 0–1 spine. Intermarginals have proximal imbrication. The superomarginals define the ambitus; they bear 1–2 spines and are about as wide as they are long. The inferomarginals bear 2–4 spines and are wider than they are long. Each adambulacral bears a transverse row of 4–6 spines: 1 (rarely 2) slender, webbed spine deep in the ambulacral groove; 1 long, blunt spine at the margin of the groove (furrow

spine); a slightly shorter, more distal furrow spine; and 1–2 (rarely 3) short subambulacral spines. Each mouth plate has 1 preoral spine, 3 furrow spines, 0–1 (usually 1) suboral spine, and 1–2 spines within the groove and hidden by the furrow spines. Actinolaterals form a distinct row between the inferomarginals and adambulacrals for less than half the ray length and then become hidden by the inferomarginals; each has 0–1 spine. A few additional actinolaterals sometimes occur in a short row next to the inferomarginals, but they are confined to the disc.

*Description of other material.*—Three other, small specimens from *Blake* stations 272, 276, and 279 also are *E. modestus*. Even the smallest has proximal imbrication, peripheral spinules (2) on the madreporite, 1–2 dorsolaterals in transverse series, a few interbrachial intermarginals, and a row of actinolaterals. The largest specimen is less than half the size of the smallest type-specimen, but it agrees with the description above in every detail except for the following: 3 peripheral spinules on madreporite; sulci and gyri of madreporite poorly developed; number of anal spinules and nature of primary circling undetermined; few members of the longitudinal series of dorsolaterals present; proportion of ray length occupied by dorsolaterals undetermined; intermarginals not yet imbricate; superomarginals longer than wide; inferomarginals as wide as long; mouth plates with only 2 furrow spines. Most differences probably reflect ontogenetic variation. The third specimen has many superficial characteristics of *E. modestus*, but the skin was not removed for closer examination. As in the type-material, the smaller specimens are progressively more robust (R:r, 3.5, 3.0, 2.9).

Clark's (1941) large specimen from *Atlantis* Sta. 3303 seems to be *E. modestus* with a few differences that might only reflect growth of the rays: the carinal series and primary circling have more accessory ossicles; the intermarginals and actinolaterals extend  $\frac{2}{3}$  the length of the ray; calcareous nodules lie free in the papular areas; rays are proportionately longer (R:r, 5.1).

*Type-locality.*—Southeastern Gulf of Mexico, northwest of Dry Tortugas.

*Discussion.*—Perrier (1881) did not specifically designate the type-material of *Echinaster modestus*, but he gave measurements for the larger specimen from *Blake* Sta. 45 and published a photograph of it in 1884. He later (1884, 1894) listed specimens from Gulf of Mexico, Montserrat, St. Vincent, and Guadeloupe stations of the *Blake* but not the specimens from Barbados. The material examined here represents all *E. modestus* held by the Museum of Comparative Zoology, Harvard University. We have not seen the specimens from St. Vincent and Guadeloupe. Because of the unsettled state of systematics of *Echinaster* (Downey, 1973; Tortonese and Downey, 1977; Tortonese and Madsen, 1979), we have designated the larger syntype from *Blake* Sta. 45 as lectotype and the other syntypes (MCZ 1119 and MCZ 4668) as paralectotypes.

Our observations confirm Perrier's (1881) brief diagnosis, but his description of spination around the ray did not reveal the kinds of underlying ossicles. The type-specimens differ from Downey's (1973) description by the presence of dorsolaterals, actinolaterals, proximal imbrication, and more spines on the mouth plates; examination of some of her material confirmed that it does not belong to *E. modestus*. Walenkamp (1979) examined some type-specimens of *E. modestus* as well as new material collected from the Guyana Shelf. His description included the lack of glassy tubercles, 3 rows of actinolaterals, a long row of intermarginals, and 4 mouth spines within the furrow; these characteristics are not found in the type-material. He did not describe the arrangement of dorsolaterals, but his description of "open areas" on the aboral surface probably reflects the arrangement of dorsolaterals and agrees with the type-material. Walenkamp (1979) assigned Downey's (1973) specimens of *Verrillaster spinulosus* to *E. modestus*. Our examination of her specimens, similar in size to the lectotype, revealed that they have no glassy tubercles, too many intermarginals, and 2–3 rows of actinolaterals. The identity of Downey's specimens of *V. spinulosus* remains unknown. *Echinaster* spp. on the west coast of Florida that have been used for experimental studies cited above lack actinolaterals, have a longer, less compact series of intermarginals, have fewer dorsolaterals and oral furrow spines, and have distal imbrication (proximal ossicles overlap distal ossicles); they are not *E. modestus*.

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